Selection of an evolved strain of *Papiliotrema laurentii* with a higher xylose consumption rate by adaptive laboratory evolution

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The growing demand for biodiesel, usually derived from vegetable oils, drives the search for alternative sources for its production, such as oleaginous yeasts. Through Adaptive Laboratory Evolution (ALE), we previously selected a strain of the yeast *Papilotrema laurentii* UFV-I, called ATS I, capable of assimilating xylose, accumulating lipids and tolerating acetic acid. Herein, we conducted a new round of ALE aiming at a higher xylose consumption and, consequently, higher lipids production to enable its use in lignocellulosic biorefineries. The ALE experiment was conducted in two different concentrations of xylose, one at 20 g/L and other at 30 g/L, added to Yeast Nitrogen Base (YNB) minimal medium without amino acids and with amonium sulfate, with triplicates of each concentration. After 90 days of evolution, the evolved strains, referred as XUIS (Xylose Uptake Improved Strains), were selected and characterized in terms of kinetic and physiological parameters and also evaluated for acetic acid tolerance. All of the evolved strains, with the exception of XUIS II, maintained the tolerance to acetic acid, an important characteristic when considering a bioprocess for producing microbial oil from hemicellulose hydrolysate, which contains xylose and acetic acid. Among the evolved strains, XUIS I, III and IV stood out as presenting the highest specific growth rates (0.401 h-1, 0.373 h-1 and 0.399 h-1, respectively), representing an increase of 57.25, 56.47 and 46.27% compared to the ATS I strain. XUIS I also showed the highest final biomass yield, lipid titer and volumetric lipid productivity. Although the specific growth rate of XUIS V was lower than that of XUIS I, this strain had the highest xylose uptake rate, 183.3% higher than that of the ATS I. Besides that, XUIS V also presented the highest lipid content, which highlights its biotechnological potential as a source of triacylglycerol for biodiesel production. Therefore, XUIS V was considered the most promising strain, showing a higher xylose consumption rate, tolerance to acetic acid and oleaginous phenotype.

Keywords: oleaginous yeast; adaptative laboratory evolution; biodiesel.

Seleção de uma linhagem evoluída de *Papiliotrema laurentii* com maior taxa de consumo de xilose por evolução adaptativa em laboratório

A alta demanda por biodiesel, combustível produzido a partir de óleos vegetais, impulsiona a busca por fontes alternativas de produção, como leveduras oleaginosas. Através da evolução adaptativa em laboratório, uma linhagem da levedura oleaginosa *Papolitrema laurentii* com maior taxa de captação de xilose e, consequentemente, maior produtividade volumétrica de lipídeos, foi selecionada com o objetivo de viabilizar seu uso em biorrefinarias lignocelulósicas.

Palavras-chave: leveduras oleaginosas; evolução adaptativa em laboratório; biodiesel.

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